

The clinical effectiveness and cost-effectiveness of screening programmes for amblyopia and strabismus in children up to the age of 4–5 years: a systematic review and economic evaluation

J Carlton,¹ J Karnon,¹ C Czoski-Murray,^{1*}
KJ Smith¹ and J Marr²

¹ School of Health and Related Research (ScHARR), University of Sheffield, UK

² Sheffield Teaching Hospitals NHS Foundation Trust, Royal Hallamshire Hospital, Sheffield, UK

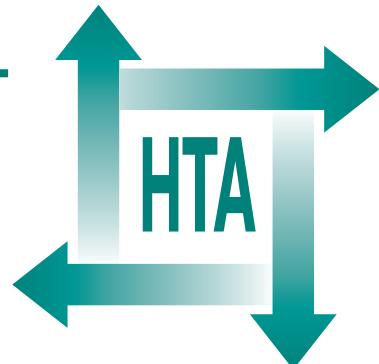
* Corresponding author



Executive summary

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Executive summary

Background

Amblyopia and strabismus are both common conditions in childhood. A Health Technology Assessment report published in 1997 concluded that the evidence for the value of screening for such conditions did not support any expansion of the current screening programme; indeed, it recommended that the National Screening Committee should consider halting the existing programme. The authors specifically highlighted the lack of evidence on the long-term impact of amblyopia, the extent of disability that amblyopia and strabismus have and their impact on quality of life. This study aims to re-examine the literature and to use this to inform a decision-analytic model to determine the cost-effectiveness of screening for amblyopia and strabismus.

There are several well-defined criteria informing the suitability of screening for a condition. The condition must be important and the natural history and epidemiology of the condition must also be understood. The screening tests used should be simple, safe, precise and acceptable to the general population, and there should be a defined diagnostic process following a test. Treatment for screened conditions should lead to better outcomes than treatment provided at the point of clinical diagnosis.

Aims and objectives

The aim of this study was to estimate the cost-effectiveness of screening for amblyopia and strabismus in children up to the ages of 4–5 years by developing a decision-analytic model that incorporates and assesses all of the above criteria. At the outset it was recognised that there was likely to be significant uncertainty in key areas of the model, and an objective of the study was to identify the major areas of uncertainty and so inform future research priorities in this disease area.

Methods

Systematic literature reviews were undertaken of the prevalence and natural history of amblyopia

and strabismus, the screening methods used in detecting amblyopia and strabismus, the effectiveness of treatment options for amblyopia and strabismus and health-related quality of life issues relating to amblyopia and strabismus. The review of treatment interventions for amblyopia and strabismus was restricted to high-quality reviews, meta-analyses and guidelines. The literature searches were undertaken in the period 18–24 January 2006. The data derived from the review informed the structure and implementation of the decision-analytic model. This was calibrated with screening data from Birmingham.

Results

The amblyopia screening model was analysed in detail to estimate the cost and effects of six alternative screening options comprising screening at different ages (3, 4 and 5 years) and using alternative sets of tests (visual acuity testing and the cover tests, with and without autorefraction). The reference case results showed that screening programmes that included autorefraction dominated screening programmes without autorefraction. Analyses based on the cost per case of amblyopia prevented showed that screening at either 3 or 4 years prevented additional cases at a low absolute cost (£3000–6000). However, when these results were extrapolated to estimate the cost per quality-adjusted life-year (QALY) gained, the reference case analysis found that no form of screening is likely to be cost-effective at currently accepted values of a QALY.

The wide-ranging sensitivity analyses found that the results were robust to most parameter changes. The only parameter that radically affected the results was the utility effect of loss of vision in one eye. No direct evidence of a utility effect was identified and the reference case assumed no effect. When a small effect is assumed (a reduction in utility of 2%), the incremental cost per QALY gained becomes extremely attractive for screening at both 3 and at 4 years. The expected value of perfect information was shown to be large when the unilateral vision loss utility parameter was allowed to vary, but not when it was kept constant at zero.

Conclusions

The cost-effectiveness results from the amblyopia screening and lifetime models show that the cost-effectiveness of screening for amblyopia is dependent on the long-term utility effects of unilateral vision loss. There is limited evidence on any such effect, although our subjective interpretation of the available literature is that the utility effects are likely to be minimal. Any utility study investigating such effects would need to be careful to avoid introducing bias.

The reference case model did not represent potential treatment-related utility effects, primarily due to an increased probability of treated children being bullied at school. The evidence indicates that this may be a problem, and additional sensitivity analyses show that small utility decrements from bullying would improve the cost-effectiveness of early screening significantly.

Recommendations for future research

A prospective study of the utility effects of bullying would usefully inform the analysis, although such a study would need to be carefully planned in order to distinguish whether the overall incidence of bullying decreases with reduced school-age treatment, or whether it is displaced to other children.

Publication

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